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Journal of the Society of Arts.

FRIDAY, MARCH 28, 1856.

FIFTEENTH ORDINARY MEETING.

WEDNESDAY, MARCH 26th, 1856.

The Fifteenth Ordinary Meeting of the One Hundred and Second Session was held on Wednesday, the 26th inst., J. K. Brunel, Esq., F.R.S., in the chair.

The following Candidates were balloted for and duly elected Ordinary Members:—

Aubert, John Lewis.	Jackson, William Henry.
Cooper, William.	Marchant, W.
Coates, J. S.	Tuson, Richard V.
Faulkner, John, jun.	Winter, James, jun.

The following Institution has been taken into Union since the last announcement:—

411. Sidmouth, Institution.

The paper read was

ON THE MANUFACTURE OF SOAP.

By WILLIAM HAWES.

I am aware that the subject of the paper I have undertaken to read this evening cannot be so attractive as many which have preceded it during the session.

I have no new chemical discoveries to report or to describe. I cannot entertain you by the exhibition of beautiful specimens of manufacture, displaying the skill of the workman, the ingenuity of the master, or the perseverance of the capitalist; nor can I startle you by showing the vast progress of a trade from which the improved condition of the people may be inferred; but, on the contrary, I shall have to show how a manufacture, which is essentially necessary to the health and comfort of all, and more especially to that of the great mass of our labouring population, and the use of a larger or smaller quantity of which may be taken as almost conclusive evidence of the position of a people in the scale of civilisation—has been checked; how every attempt at its improvement has been thwarted; how the cost of the soap produced has been increased; how, in fact, by the odious interference of the excise, a chemical process has remained with scarcely an improvement for the last 200 years.

Before I describe the manufacture, I will briefly notice the little we know of the history of soap-making.

Soft soap appears to have been in general use from time immemorial. It was made from fish oil and the ley from wood-ashes, boiled together till they were of the consistency of honey, but we hear little or nothing of hard soap, from its introduction to this country, early in the 16th century, until 1622, when letters-patent were granted for twenty-one years to various titled persons for its manufacture with barilla, and for the manufacture of soft soap without the use of fire “by sundry motions, and not by boiling thereof.” These patents were not worked; but in 1631 another patent was granted for fourteen years to Sir Wm. Russell, Sir Richard Brooke, and others, with a proviso that certain privileges might be disposed of by his Majesty Charles I.

In 1632 a third patent was granted, for a new mode of making white soap, whereby it should be cheaper and better than the soap then in use, and on condition that the patentees would pay to his Majesty £4 per ton upon every ton of soap sold, and that they should be incorporated by the name of the Governor, Assistants, and Fellows of the Society of Soap-makers of Westminster. Their Charter gave them the exclusive right to make soap by any of the ways then known, or by any new ways—to search for soap made by others and to destroy it, &c.

The corporation agreed to make 5,000 tons of white soap yearly, and were to pay, after the first year, £4 per ton to the king, and not to sell the soap at above 3d. per lb.

This corporation adopted various means to prove that their white soap was superior in quality to any other soap then made, and obtained from Sir Robert Ducie, the then Lord Mayor of London, a certificate to the effect that, after trials in his own house, he found the soap made by the corporation to be better than that made by the old soap-makers.

The public were not, however, satisfied with this decision, and the low price of fish oil enabled the old makers successfully to maintain their trade in soft soap.

To stop this competition, the Westminster corporation of soap-makers obtained a proclamation from the king, prohibiting the use of fish oil in soap, and also the sale of any soap not tried and approved by the assayers of the soapers of Westminster.

This being also ineffectual in stopping the trade, an information was laid in the Star Chamber, Nov. 22, 1632, against sixteen soap-makers in London, for opposing the letters patent of the said corporation, for using fish oil, and for selling unmarked soap.

The soap-makers pleaded in opposition to this information, that they were all free men of London, that the patent was a monopoly, and contrary to the laws of the kingdom. This plea was referred to the judges, who, after many hearings, which occupied from Nov. 1632, to May 1633, condemned all the defendants to be imprisoned during his Majesty's pleasure—to be disabled from using their trades, and to be fined, some £1,500, some £1,000, and the least £500; all were committed to Newgate, where two died; thirteen were confined for forty weeks, and one nearly twelve months; nor were the fourteen survivors released till they had given bond not to make soap again. The fines were all levied, and extents, when required, were issued against their property for the amount of the penalty.

These proceedings were followed by a general decree in the Star Chamber, August, 1633, whereby the monopoly of the Corporation was confirmed and surrounded by more severe restrictions. The price of soap was fixed at 3d. per lb., with penalties against those who exceeded this price as persons who “oppresseth the King's subjects,” and the manufacture was confined within a distance of one mile from London and Bristol. So strong, however, was the dislike of the soap manufactured by the Corporation, that women in the streets gave away printed statements, showing “how the soap spoiled and burnt the linen, and fretted the hands of the washers.”

In consequence of this opposition it was ordered by the Council that it should be referred to the Lord Mayor, Sir Ralph Freeman, and others, to inquire into the quality of this soap. Above four-score witnesses were examined—countesses, viscountesses, ladies, and common laundresses, who all certified to its inferiority, and a proclamation was therefore published, ordering the Lord Lieutenant and Sheriffs of London to seize and sequester all the soap made by the soap-makers of London.

Under this proclamation attachments were issued against various makers, and the pans, vats, and utensils of above 40 were destroyed.

Other proclamations were issued from time to time, regulating the price and mode of manufacturing soap, and imposing heavy penalties against offenders.

The importation of foreign soap was prohibited, and a warrant dormant was opened to apprehend such persons as the Governor of the Corporation of Soapers in Westminster should nominate. In justification of these oppressive measures it was alleged that the Corporation had in two years spent £6,000 in law, £115,000 in general expenses, that their yearly charges were £8427, and still they could not sell soap. So determined, however, were the people not to purchase their soap, that in November, 1634, the Corporation were obliged to engage one of the old soap-makers to manufacture for them, not-

withstanding his bond to the contrary; and to such an extent did he succeed, that for many days together, in February, March, and April, 1635, they sold £500 worth daily. This led to further prosecutions, fines, and imprisonments, which ended in 1636 by the Corporation entering into a new covenant with the King, whereby they agreed to make 5,000 tons of good soft soap yearly, paying £6 per ton thereon to the King, and to sell at 3d. per lb. This arrangement was not more successful than its predecessors, and shortly afterwards the patentees of Westminster obtained from his Majesty a grant of £40,000 for surrendering their patent, and £3,000 more for charges of their houses, to be paid by the old soap-makers of London, who also agreed to take their materials, valued at £20,000, and all this only to "have their old trade back again." The King then incorporated the soap-makers of London, and they agreed to pay £8 per ton to his Majesty, without raising the price to the public, and which tax, in three years, produced the large sum of £90,000.

In 1646 the makers petitioned the House of Commons to remove the duty on soap, and to substitute for it a duty on the raw materials. In 1650 a duty having been placed upon the raw materials, and that upon soap retained, we find it declared, in a petition to the House, that the trade "has been driven into holes and corners in all parts of the kingdom, and that the duty upon soap made in London had fallen from £4,658 in 1643-4, to £2,108 in 1649-50." From this time to the 10th of Anne, we know nothing of the progress of the trade. In that year the excise on soap was firmly established, first at 1d. per lb., then in two years advanced to 1½d. per lb., at which rate it remained till 1783, when it was raised to 2½d., and in 1816 it was again increased to 3d. per lb., or £28 per ton, each advance of duty bringing with it additional restrictions upon the manufacturer, under the erroneous idea that the security of the revenue would be thereby increased. It was, however, clearly proved to the Chancellor of the Exchequer in 1833, that illicit trade was systematically increasing, and the duty derived from soap as a consequence decreasing, facts which induced Lord Althorpe to reduce it to 1½d. per lb., at which rate it remained until it was finally repealed in 1852.

Before proceeding with my subject, it may be useful to consider for a moment the effect of the Excise regulations upon this trade. The manufacturer was not allowed to make his soap as he thought best; but was obliged to make it according to rules prescribed in Acts of Parliament passed in the reign of Queen Anne. He was required, in the 19th century, to adopt the processes used in the 17th century. From a given quantity of the raw materials, weighed by the Excise, he was obliged to produce, and pay duty upon—whether produced or not—a fixed quantity of soap, notwithstanding the ever-varying quality of such materials. Deviations from fixed rules involved heavy penalties; the omission, for instance, of a notice to light a fire twelve hours before it was required, subjected him to a penalty of £20, and the omission of a notice to put materials into a copper, to a penalty of £100, and so on.

From these sources of annoyance—from these fetters upon the exercise of skill and knowledge, the manufacturer is now, and it is to be hoped for ever, relieved, and this last remnant of that debasing system of taxation, which taxed our air, our light, and our cleanliness—by which ignorance and fraud were tempted, by the facility of evading high duties, into rivalry with intelligence and honesty, and under which the exciseman became a judge whether an improvement, desired by the manufacturer, should be introduced or rejected, is entirely abolished.

One after another the candle duty, the window tax, and the soap duty, have fallen before the intelligence of modern times, and light, air, and cleanliness are no longer stinted in quantity, or enhanced in price, by the interference of the Excise.

I think it of so much importance that the injury in-

flicted upon trade by an Excise should be thoroughly appreciated, that I will venture to place some of the statistics of the trade before you, that you may compare the activity and enterprise which have so distinguished the manufacture of candles and alkali since the repeal of the Excise duties on salt and candles in 1823 and 1831, with the state of the soap trade during the same period. The time to which my figures refer is so distant, and the state of the trade since the removal of the duty is so changed, that no injury can arise to any one from the exposure of the miserable state to which it was then reduced.

The quantity of soap upon which duty was paid, shewed a consumption per head of the population, per annum, of 5·9lb. in 1833, the duty being 3d. per lb., and 7·14lbs. in 1843, the duty being then but 1½d. per lb., whilst it was ascertained, on good authority, and after most careful enquiry, that the quantity used in many large workhouses was as the rate of 7½lbs. per head per annum; that convicts were allowed 11½lbs. per head per annum; that the labouring classes used above 9lbs. per head per annum, and the classes above them from 12lbs. to 24lbs. per head per annum.

It was also shown that in Jersey, where there was no duty on soap, the quantity used was 13·1 lbs. per head per annum; in the Isle of Man, it was 8·68 lbs.; in Jamaica, including the negro population, it was 4·80 lbs.; and in Ireland, 4·92 lbs. per head per annum; whilst, then, it was clearly ascertained that not less than 10 lbs. was used by each person per annum in England and Scotland,—the duty was collected in 1833 upon 5·9 lbs., and in 1843 upon 7·14 lbs. for each person.

Was it possible for any trader, working under such a system, to avoid one of two dilemmas, either to evade the duty in self-defence, or to withdraw from such a competition.

Now, let us trace the actual result of this state of things upon the trade.

In 1833, there were in England 262 licensed soap-makers. Between 1833 and 1848, licenses were taken out by 344 new makers; making a total of 606 makers in business in 1833, and commencing soap-making between 1833 and 1848. Of these 606, only 157 were in business in 1848, 449 having failed or left the trade in the fifteen years, and of the 157 remaining in 1848, not more than 70 were in business in 1833, out of the 262 then at work, and of these 70, several had failed, but continued their works during this period of 15 years.

Such, then, was the state of a manufacture employing from £1,000,000 to £1,500,000 of capital, but carried on under the fostering care of the Excise, whilst in the same period alkali-making, which did not exist in this country as a branch of manufacture till some years after the repeal of the salt duty in 1823, and the candle trade, to which, at that time, neither machinery nor science had been applied, have both expanded and become important national manufactures, and have rewarded almost everyone who has brought science or capital to bear upon them.

I will now proceed to describe the manufacture of soap. Soap is of two kinds, hard and soft. Soft, the elder manufacture, is made from fish oil, a portion of tallow, and potash; hard, from almost any fatty matter, whether animal or vegetable, in combination with soda.

Soft soap was in general use in all parts of the world long before hard soap was known. No doubt, from the easy combination of the ley obtained from natron in eastern countries, and from wood ashes in more northern climates, with oil or other fatty matter. Boiling these together, and evaporating off the excess of water, either by fire or by exposing the mixture to the heat of the sun, would produce a soft unctuous mass, or soft soap.

Our soft soap of commerce is a simple mixture of oil, vegetable or animal, and a given quantity of tallow, with a ley of caustic potash. No more alkali is used than is required to form the soap, which being added to the oil and tallow in a ley of light specific gravity, is gradually

concentrated till the soap attains the required consistency, when it is taken from the copper, and run into barrels for sale. In a short time it assumes the speckled appearance of the sample on the table, which speckling arises from the gradual crystallisation and separation of the margarate of potash from the oil soap.

The regularity of this crystallisation is the best evidence of the perfect manufacture of the soap. No glycerine, if it be produced, is removed from the copper during the process of making soft soap. If produced—and to this I shall refer hereafter—it is left in the soap. The produce of soft soap from a ton of oil and tallow is much greater than from the same materials if made into hard soap; it is, therefore, the cheapest soap, and where it can be advantageously used, as in washing wool or cloth, is, no doubt, the most economical. Its smell and its consistency prevent its general use for household purposes.

Hard soap, as I have already stated, is made from any animal or vegetable, fat or oil. Specimens of the various kinds of soap, supplied to me by my friend Mr. Soames, are on the table.

The white and mottled soaps of commerce are distinguished from yellow soap by the absence of resin; in other respects, though the process of finishing differs, they are alike, each 100 parts, when of good quality, containing about 63 of fatty acid, 6.5 of alkali, and 30.5 of water, or, in other words, one atom of soap consists of 17 atoms of water, one atom of grease, and one of alkali; but I am sorry to say that the rage for cheap soap, induced by its high price, the consequence of a high duty, has led to the mechanical admixture of large quantities of water with yellow soap, the practical effect of which is to lower the money price per lb., but to lower the quality of the lb. still more, and besides the injury to the quality, the buyer has to pay for mixing the water with the soap, and for its cartage to his house, a very dear way of obtaining that which any pump or water company will supply almost for nothing.

The process of hard soap-making is not so simple as that of soft soap. A solution of nearly caustic soda is added to the fatty matter. These are boiled together just sufficiently to allow gradual combination of the alkali with the grease, when the excess of ley is separated from the imperfect soap and is run off into reservoirs below; another portion of alkali is then added, the boiling is continued till the soap is chemically perfect though not finished commercially, and here begin the processes by which the special character is given to the different descriptions of soap.

Mottled soap, perhaps the most perfect of all, is boiled into a curd on a strong alkaline ley, and, a few hours after the boiling has ceased, is taken direct from the copper to the frame or mould, from which, when cold, it is cut up into bars or cakes for sale.

During the process of cooling mottled soap, a curious change takes place.

It is put into the frame of the consistency of thick paste. In a short time there is a considerable evolution of heat—the thick soap becomes almost fluid—the excess of alkali mechanically held between the grains of the curd falls through it to the bottom of the frame, leaving the stain you see in the slab of soap on the table. At this moment the crystallisation of the soap begins, and just as this is perfect or imperfect, so is the quality good, and the mottling regular and handsome, varying very little from the top to the bottom of a frame 10 or 12 feet in height, and containing from 20 to 40 cwt. of soap. No extraneous matter can be added to mottled soap without destroying the regularity of the mottling, and this soap is therefore nearly always of one uniform quality, and the most economical for household purposes.

The clarifying process, which, with mottled soap, takes place in the frame, is performed upon yellow soap in the copper. After the soap is made, and the great excess of strong ley used for finishing the soap is run off, a quantity

of weak ley is added, and mixed thoroughly with the soap by gentle boiling. The soap is then allowed to cool gradually, and in two or three days this weak ley, having a little higher specific gravity than the soap, subsides, carrying with it all extraneous matter, and leaving the soap floating upon it, which is then skimmed off and put into the frame to harden. It is when taken from the copper, and before being put into the frame that water, or a very weak alkaline ley, or a solution of sulphate of soda is added to reduce the price, either one or the other being merely mechanically mixed with the soap.

White, or curd soap, differs from both mottled and yellow. It is made from the finest tallow only, and boiled to a much thicker consistency, upon a stronger alkaline ley, than the other soaps, and before being put into the frame to cool, requires crutching or stirring about in an intermediate vessel, to break and mix the curd, so that, when cool, it shall be uniform and homogeneous. No clarifying process is required, nothing but the best and cleanest materials being used for this soap.

Fancy or perfumed soaps are made by the addition of perfumes to yellow or white soap, either when taken from the copper, and before being put into the frame, or by re-melting the perfect soap and adding the perfumes to it. In this state it is moulded into any form, or stamped with any device the perfumer requires for his trade.

Having manufactured the soap, I will now devote a few words to its uses.

I must assume you are all familiar with its ordinary application as a detergent, but as little thought is often bestowed upon the causes of effects which are of daily occurrence, I will point out how and why a compound of grease and alkali should produce such beneficial results.

In washing, two desiderata are required; one to cleanse, the other to cleanse without injury to the most delicate fabric.

Alkali alone will cleanse, but it will not wash. If used alone, a little carelessness as to the quantity used, and fine linen would be destroyed, and a very unpleasant effect produced upon our hands and faces; but if combined with fatty matter, you have it so minutely divided and so small a quantity in action at once, that neither the most delicate fabric nor the most beautiful complexion can be injured.

In this state you may rub it into materials of the finest texture without any fear of injury from the alkali itself, or from the mechanical action of washing; in fact, one portion of alkali, united with grease, totally changed in its character, becomes the medium whereby another portion of alkali can be so thoroughly incorporated with the articles to be washed, as to ensure the combination with, and the removal of all impurities by which they are soiled. Whilst, then, the pure alkali cleanses, that combined with the grease forms an anti-attrition, which preserves the articles washed from injury.

A striking contrast to this mode of washing is seen abroad, where but little soap is used, and that little is forced into the linen by beaters, to its serious injury, washing generally taking place by the river side, out of doors.

This mode of washing has been adopted not only to economise the use of soap, but on account of the inability of the poorer classes to obtain cheap fuel and the other utensils necessary for washing in warm water.

Having thus described in general terms the manufacture of soap and its use, I will next refer to the few improvements which have been effected in the apparatus and mode of working. The most important, and the first in date, was that of boiling by steam, which was successfully used in the manufactory with which I was connected, in 1825. The steam was applied by means of a coil of pipes placed at the bottom of the copper, when simple concentration was required, or was blown into the copper through a

perforated coil, when mechanical action was necessary, or both were used together, most beneficially, thereby securing the most rapid and most perfect mixture of the materials—every portion of grease being thereby brought into contact with the alkaline solution. The process, by this combination, was more rapid and more perfect than could be accomplished by an open fire, acting directly upon the bottom of the copper, saving, at the same time, great waste in broken pans, leakages, &c.

The next improvement was the iron frame or mould in which the soap is cooled. Mr. Doe, an iron-founder, in London, first introduced it, but it was only after much trouble that the Excise allowed it to be used.

These are the only improvements in the apparatus for making, and in the mode of manufacturing soap, since the reign of Queen Anne. With these exceptions, the manufacturer has not been allowed to use any other apparatus, or to vary the process described in the Excise Acts of 1710; and so recently as 1835 it was with great difficulty, and only after the strong recommendations of the Commissioners of Excise inquiry, that manufacturers, even if they asked for permission so to do from the authorities, were allowed to make experiments; but this privilege, unwillingly granted, was clogged with so many forms, that it was practically useless.

Indeed, it may be asserted with perfect truth, that until the present Chairman of Inland Revenue became the Chairman of the late Excise Board, every obstacle that a vicious system of excise could offer to improvements was rigidly enforced.

This system was gradually relaxed; Mr. Wood listened to the complaints of the trade; more intelligent officers were appointed; and many vexatious and useless regulations were repealed or modified; but it was not in his power to prevent illicit trade, in competition with which no respectable maker could be really successful, nor could he afford to waste his time or money in making improvements which could be carried by the exciseman to his neighbour and rival.

But the injury to the trade did not stop here. It converted every intelligent and active manufacturer, first into a stationary machine, on account of the difficulties which surrounded him if he attempted the most trifling change either in process or apparatus, and ended by making him an opponent of improvement.

Every extension of his Excise-regulation plant—every pound of capital invested in it, pledged him deeper and deeper to the old system, till at last he was compelled to stand still himself; and then, to prevent others from improving, he became an active supporter of the Excise, as the best mode of securing his property from destruction.

Now, with such influences at work for two hundred years—for from the first moment when soap could be called a manufacture, it had been under the Excise—can you be surprised that while on all sides of it old manufactures have been improved, and new ones have risen up, that this has stood still. Unlucky indeed may any one think himself who has spent the early years of his life, bound hand and foot to that heavy broad-wheeled waggon, moving on its dull and monotonous way, uninfluenced by anything around it, and gaining no experience by the past, which was driven by a board of gentlemen styled the Honourable the Commissioners of Excise.

I have thought it necessary to dwell at some length upon this part of my subject, because, when new taxes are under consideration, and a class of politicians is advocating a return to the system of indirect taxation, it is of great importance that the injury the excise inflicted upon all manufactures under its surveillance—how their progress was checked—the law evaded—and perjury encouraged for 160 years—should never be forgotten.

Having thus rapidly described the process of soap-making, I will now direct attention to the materials used in its manufacture.—The first in importance is tallow, under which term I include every description of animal and

vegetable, fat and oil. Until within the last forty years hard soap was almost exclusively made from foreign and English tallow, with a small quantity of fish oil for the commonest soap and resin. Nineteen-twentieths of the foreign tallow was imported from Russia.

Gradually, however, a great change has taken place, and the importation of palm oil, which had then scarcely commenced, has steadily increased till it now amounts to nearly 40,000 tons per annum, the greater part of which is used in soap, though the proportion required for candles is increasing daily. This supply of a cheap oil, applicable to the manufacture of candles, as well as to that of soap, has been attended with most interesting results. It has helped, with the annually increasing use of gas in private houses, to make this country nearly independent of Russia for the supply of the raw materials for soap and candles, but it has done more than this; it has promoted the success of the efforts this country has so persistently and honourably made, to suppress slavery and the slave trade.

This trade in palm oil, the produce of that part of the western coast of Africa lying between 5° north and 2° or 3° south of the equator, from whence the greatest number of slaves was drawn, has done much to improve the condition of the negroes, by introducing to them a yearly increasing quantity of English manufactures. It has provided the chief with an income arising from the employment of his people, greater than he could realise by their sale, and in this instance, as in most others, we find that the productive power of nature, when properly used, is a more practical teacher of sound principles—a more certain civiliser of barbarian tribes, and a more effectual weapon wherewith to combat heathen ignorance, than coercive laws, or the persuasion of churchmen to whatsoever church or creed they belong.

A curious illustration of the absurdity of the Excise interference is shown in the progress of the use of palm oil.

Its red colour, which is no doubt familiar to all, limited its use to yellow soap. Several processes were invented to remove this colour, so that the oil might be used for other soaps. That most commonly in use at the time to which I refer was mixing nitric acid with the melted oil, by which its bright red colour was changed to a brownish red.

By experiment we found that a much cheaper and better result could be attained by simply raising the temperature of the oil to 400 deg., thereby avoiding the use of any chemical agent whatever.

The question then arose, how could this be done without the knowledge of the Excise, who of course had access to the place when the oil was decoloured, and could be present whilst the process was in progress; and it was accomplished by our daily going through the absurd ceremony of carrying from the laboratory, first, a bottle of coloured water, and afterwards a coloured bottle only, which was supposed to contain the ingredients by which the colour was removed.

Under this simple disguise we decoloured palm oil by a process unknown to any other maker for nearly ten years, when it was discovered and made public by our gas-maker, who found, whilst making his gas from palm oil, that the oil which leaked from a joint in the feed-pipe, close to the heated retort, was white instead of red.

I have said this oil is as useful in candle-making as in soap-making, but it is right to add, that it is only within the last few years that this desirable result has been attained, after long and arduous experiments, and the application of much scientific knowledge by my friends the managers of the candle company.

And here let me for a moment call your attention to what was not, I think, sufficiently dwelt upon by my friend Mr. Wilson in his interesting paper upon candle-making, I mean the effect of the repeal of the candle duty in 1831. Had that duty remained on candles till 1852, as the duty did upon soap, it is not too much to say that the improvements in candles and candle-lamps of

Messrs. Palmer, and the splendid works at Vauxhall would not have existed, and as in past times, we should now, where gas could not be used, or was not to be obtained, be reading and writing by the dim, flickering, and fluctuating light of a dip or a mould, ever wanting snuffing, and spreading dirt and its annoyances around it.

I hope to show an equally important future is in store for the soap trade, so soon as its freedom from the Excise has had time to induce capital, science, practical knowledge and industry united, under a new law of partnership, to bring their powerful influence to bear upon it.

The other raw material used in soap is alkali, soda for hard soap, potash for soft soap. Here, again, we see the effect of the repeal of an Excise duty upon price and quality.

Alkali, during the existence of the salt duty, cost from £8 to £12 per ton of soap. The price fluctuated as the crop of seaweed in Spain and Teneriffe was good or bad, and, excepting the small quantity obtained from kelp, all the alkali used was imported from foreign countries.

So long as we derived our alkali from barilla and kelp, the high duty on soap, except as it affected improvements, was of little consequence to the fair trader, for independently of the capital required for the purchase of so costly an article, its bulky form was a better check upon illicit trade than all the regulations of the Excise. For every five tons of soap made, the maker had to cart into his premises nearly two tons of barilla and kelp, and to carry away, mixed with lime, nearly the same quantity of waste, and, if he had used kelp only, nearly twice as much. The appearance of this waste was so peculiar, that no one could doubt that where a heap of it was seen, soap making was near. The alkali for a ton of soap, which then cost from £8 to £12, is now, in consequence of the repeal of the salt duty, reduced to £2 per ton of soap. It is supplied to the soapmaker in a very pure state, requiring only to be deprived of its carbonic acid before it is ready for use.

The effect of the repeal of the salt duty upon the soap trade, important as it has been, was quite secondary to its effect upon glass-making, and in establishing a large trade for alkali, in lieu of the small trade in barilla. For instance, we imported in each of the five years from 1830 to 1834, 12,000 tons of barilla, worth about £200,000, whereas I find from a valuable paper of the statistics of the alkali trade, prepared by my friend, Mr. Alhusen, of Newcastle-on-Tyne, that we now export 50,000 tons of alkali, and crystals of soda annually of the value of £423,000, and that the manufacture is estimated to employ between 6,000 and 7,000 men, about 370,000 tons of shipping, and that about 500,000 tons of coals, and 140,000 tons of salt are annually consumed to produce a better alkali at one-fifth the price at which we obtained it when the excise was on salt.

It must not be supposed, however, that because few improvements have been made in the process or in the utensils used in the manufacture of soap, it has been for want of so called inventions, or for want of that will o'the wisp of inventors, patents, for their improvement.

I am afraid to say how many patents have been taken out for this object; how many persons, tempted and deluded by the imaginary profits of a monopoly, have employed valuable time and energy, and spent much money to no purpose.

Failure has invariably followed such attempts, because the fear a projector entertains lest some one should gather his golden apple when just within his grasp, prevents his seeking information and advice, from those able to afford it, as to what is wanted—what is known—what has been tried and failed, and what is likely to succeed. I feel satisfied although in this society I know my opinions are those of a small minority, that the patent laws, whether viewed from the inventor's point of view, or from that of the public of whom he asks a monopoly, are alike injurious to all, and that both patentees and the public—except

in a few rare cases—are injured by the protection supposed to be afforded to the one, and by the enhanced price, consequent upon the monopoly granted to the other, and because, instead of relying upon their own knowledge and skill for success, patentees prefer placing their trust in the protection of restrictive laws, which the whole experience of legislation proves to be a snare and a delusion. Indeed, I feel sure, could we ascertain who found the capital for patents, we should be surprised how exclusively it had been provided by persons out of business, unacquainted with the real state of the manufacture to which they related, and who were misled by glowing pictures of large gains to be secured by a monopoly, to be purchased for a trifle.

The only patent relating to the manufacture of soap which appeared likely to succeed and to lead to a practical result, was for combining the materials by mechanical means without the aid of fire, the object being to avoid the formation of glycerine, which brings me to the last division, though not the least important division of my subject, for it is in this direction, I look for the first great result, from the removal of the supervision of the trade by the Excise.

I feel satisfied, however, that much inquiry, and a series of accurate experiments on a large scale, must be devoted to this subject, before the success I confidently look for can be achieved.

If the theory of the manufacture now generally received be correct, I am not sanguine of great improvements being made in the process.

It is hardly possible to have purer or cheaper alkali.

The process of combination, by the joint action of steam and fire, or by steam only, is simple and rapid, and the treatment of the soap, cooling it in frames and then cutting it into bars, after the chemical process is perfect, cannot be much improved or cheapened; but if we seek for new principles under which the saponification may take place, there is room for great economy of the raw materials, and, therefore, for the production of an equally good, if not superior, article at a very much lower price.

At present, from 8 to 10 per cent. of the fatty matter used in soap-making is converted into glycerine, and is wasted. We make nearly 100,000 tons of soap annually, requiring 60,000 tons of tallow, oil, &c., one-tenth of which is absolutely thrown away. 6,000 tons, at £30 per ton, or £180,000 per annum, is the measure of this waste.

The quantity of fatty matter required to make a ton of perfect soap, is 13cwt., 3qrs., 0lbs., or 1540lbs., but analyse the soap so produced by what means you may, you cannot reproduce more than 1,400 lbs., not of tallow, but of fatty acid or hydrogenated tallow, and therefore representing really but little more than 1300 lbs. of tallow. The difference between these quantities is to be found in the glycerine. The question then arises, is tallow, according to the commonly-received opinion, a margarate of glycerine, or is glycerine a portion of tallow highly oxidised during an imperfect process of making the fatty acids?

Tallow is generally assumed to consist of—

Carbon.	Hydrogen.	Oxygen.
75.966	11.700	9.304
and glycerine of—		
Carbon.	Hydrogen.	Oxygen.
40.017	8.925	51.000

but the fact that the glass in my hand contains sodium in pure tallow, appears inconsistent with this theory, and leads to the conclusion that tallow is a hydro-carbon. The composition of olifant gas, the product of tallow, also appears to me to confirm this view.

When, then, this hydro-carbon is to be made into soap, it is combined with soda, and we have—

1. Fatty acids—carbon, hydrogen.
2. Soda—oxygen and sodium.
3. Water—hydrogen and oxygen.
- And, in a separate form—
4. Glycerine—carbon, hydrogen, and oxygen.

The changes which have taken place to produce these results are, the decomposition of water, the hydrogen combining with one portion of the tallow, and the oxygen with another portion,—the one to form soap in combination with the soda, and the other to form glycerine.

It is immaterial to the theory of the manufacture of fatty acids and the production of glycerine, whether tallow contains oxygen or not. If there, it remains in the fatty acid. All I wish to show is, that glycerine is a portion of the tallow highly-oxidised during an imperfect, and at present ill-understood, process; and, to confirm this view, I believe it will be found that if an amalgam of sodium and mercury be triturated together with tallow, and water very carefully and gradually added, no hydrogen will be evolved nor glycerine produced.

Now every soap-maker knows that he cannot make soap with a soda ley above a certain specific gravity; and he also knows, by experience, that with a weak ley the operation is easier, and that the production of soap is greater in proportion as the combination is quick, and the number of operations or boilings whilst free grease remains, is few.

Again, if tallow be a margarate of glycerine, how is it that simple distillation breaks the combination, and produces margaric acid and glycerine, whilst the strongest soda ley will not do it, though a weak soda ley will do so?

But if we suppose that under the influence of a high temperature with steam the affinity of margaric for hydrogen is increased, and a portion of water is decomposed, then we find all the elements of the two products, and we obtain margaric acid, or hydrogenated tallow, and glycerine, or oxidized tallow; and carrying out my views, I believe that, could the tallow, oil, &c., be distilled in hydrogen, instead of steam, no glycerine would be found.

By Mr. Wilson's process of distillation, he informs us that the proportion of glycerine is 8 per cent., but every soap-maker who has carefully watched his processes knows, that from causes but ill-understood, the product of soap from a given quantity of tallow varies very much, and I believe this variation is often put down to wrong causes, and really depends upon the rapidity of the combination of the alkali and the grease. If this be tedious, and the boiling in fresh ley oftentimes repeated, a serious deficiency arises in the quantity of soap produced, every fresh quantity of ley carrying off a certain portion of oxidized tallow or glycerine, as well as a portion of imperfect soap.

Now, knowing that this view of the process of soap making, and, indeed, of composite candle making, is not that generally accepted, I submit it with diffidence, and only ask that it may receive due and careful consideration from those interested in the subject; but, supposing my idea to be wrong, then another question of importance arises to the soap maker, viz.: why is not this vast quantity of glycerine, now entirely wasted, preserved and turned to useful account? and it is in this direction, either to prevent the formation of glycerine, and thus to increase the product of soap from a given quantity of tallow, or to save and apply to useful purposes what is now wasted, that I expect to see the first fruits of the relief of this important branch of industry from the trammels of the Excise.

DISCUSSION.

MR. WARREN DE LA RUE, F.R.S., said, he was sure that the meeting would agree with him that they were greatly indebted to Mr. William Hawes for his interesting communication read that evening, which must be considered of greater value as coming from one whose practical acquaintance with his subject ensured the accuracy of the facts he brought forward in illustration of his views. Before entering, however, upon a discussion of the *rationale* Mr. Hawes proposed, to account for the process of saponification, and of his views of the constitution of the neutral fats; it was well perhaps to pause and reflect how strongly his elaborate history of the soap manufacture in England

brought out the indomitable energy and perseverance of the English manufacturer, both in remote and recent times. Having been charged, in 1851, together with Dr. Hoffmann, to write a report on the products of Class XXIX., he could testify to the fact, as had already been done, that the British soaps manufactured under the then excise restrictions, did vie in excellence with the best productions of foreign countries. Again, it was gratifying to see recorded in the history of the soap manufacture, that the flood of public opinion in England, although for a term it might be pent up and restrained, would, in the end, sweep away the restrictive and injurious laws which press upon those manufactures most conducive to the health and well-being of the community. The duty on salt had scarcely disappeared, in 1823, before Leblanc's method of preparing soda from sea-salt, gave us, in the hands of a Muspratt, a cheap and excellent alkali, to be substituted in the manufacture of soap for an impure carbonate of soda, in the form of barilla, which we had to seek in Spain and Teneriffe. At the same time, and as a secondary product, we got chloride of lime to be used in our bleach works and paper manufactories, and we thus saw how intimately one branch of industry connected with another, and how the removal of a single obstacle gave room for development in a variety of arts. He had every hope, with Mr. Hawes, that in the course of time, now that the restrictions on the soap manufacture were entirely removed, that we should see improvements take place in the processes at present employed; at the same time, it must be admitted, that the old process was one of the most beautiful of chemical operations although its discovery preceded by ages the scientific explanation of it, which the researches of Chevreul had brought out. While reflecting on all this, with the interest which attached to it, it was also pleasing to find, that within the domains of some of the administrators of our laws a spirit of enlightenment had broken down the bulwarks of circumlocution; for in his historical sketch, Mr. Hawes had placed it on record, that the present Board of Inland Revenue, headed by their gifted chairman, Mr. John Wood, had for years done all in their power to remove from the processes of manufacture they had to control, every restriction possible with the state of the law for the time being. The good thus done to the community was almost incalculable, and he believed at the same time the revenue was benefitted. Passing over the description of the processes of soap-making, so lucidly described by Mr. Hawes, he wished to make one or two remarks respecting the new theory of saponification that gentleman proposed, which, with all deference, he believed would not supersede that of Chevreul, who first established the analogy of neutral fats to salts, or rather compound ethers, a theory which every more recent investigation, for example, of Dr. Stenhouse, Pelouze, and others, had established on a firmer basis, and which had recently received a remarkable synthetical confirmation by the researches of Berthelot, who, by exposing fat acids in closed vessels, in contact with glycerine, to a high temperature, varying from 212° to 536°, had reproduced the neutral fats, and made also some interesting compounds not met with in natural productions. Mr. Hawes seemed to think, that because sodium might be kept in melted tallow without undergoing change, that, therefore, neutral fats could contain no oxygen, and that they were hydrocarbons. No deduction could be more fallacious. For years he had been engaged on the chemical examination of a series of hydrocarbons, and he had invariably found that the oxygen compounds they contained were removed with the utmost difficulty by the alkaline metals; that, for example, sodium might be kept for months in them without entirely decomposing the oxygen compounds, and that after this treatment these hydrocarbons might be boiled for days in them without entirely decomposing the oxygen compounds; and that, to obtain the hydrocarbons pure, it was necessary repeatedly to distil them in an atmosphere of dry hydrogen, from a

retort containing clean sodium or potassium. Moreover, although sodium might be kept in melted tallow without change, yet, if the temperature was raised to, say, 400° Fahr., then a very violent action ensued, the sodium being oxidised at the expense of the oxide of glyceryl, an anhydrous soap being formed, and a hydrocarbon and hydrogen being evolved. Again, we should all be disposed to admit that water contained oxygen, as we knew that it could be formed by the combination of oxygen and hydrogen gases. We knew also that sodium decomposed water with violence, and, under certain circumstances, with deflagration; yet he had in his hand some water in which he had placed sodium, and there was no reaction. We should be wrong, however, in inferring that water contained no oxygen. He ought to have mentioned that he took the precaution of saturating the water with soda; and as the water could dissolve no more soda if produced, the sodium did not, when placed in contact with a saturated solution of soda, tend to decompose it. The fact that soap was not readily made with a soda ley might possibly be accounted for, first, by the fact that soap was not readily soluble in it, and thus the fat was protected from the action of the alkali; secondly, that the affinity of the concentrated ley for its water might prevent its readily yielding, to the oxide of glyceryl, the necessary water to combine and form its hydrate, glycerine. That the action of steam or water at high temperatures should split up the neutral fats into their acids and glycerine, while distillation, *per se*, or in an atmosphere of hydrogen, gave rise to other products, was explained also by the fact that, to form glycerine from the oxide of glyceryl, as it existed in neutral fats, the presence of water was needed. The facts mentioned by Mr. Hawes showed that he was a close observer of phenomena; and, although he (Mr. De la Rue) differed with him as to the explanation, still great value could not fail to be placed on his observations.

Mr. G. F. WILSON, F.R.S., said that as his friend Mr. Hawes, in the very valuable paper just read, had noticed an omission in a paper of his lately read before the Society—the not having sufficiently referred to the beneficial effect on the candle manufacture arising from the removal of the Excise duty,—he might be allowed to say that he brought this point forward in a former paper, and that he entirely agreed with Mr. Hawes in believing that had the excise on candles continued, candle-making would have remained what soap-making appeared to be—a somewhat improved, but still very imperfect, manufacture. He must beg as entirely to dissent from Mr. Hawes's opinion as to the effect of patents on manufactures; and as he had kindly instanced the Vauxhall works in support of another argument, he must allow him to instance them as showing the fostering effects of patents upon a young manufacture. Had they at Vauxhall not had the prospect of future protected years to pay for the expensive experiments necessary for perfecting their distilling machinery, they could not in prudence have ventured on the large necessary outlay. He was sorry to say that his knowledge of soap making was more theoretical than practical, having only had the opportunity of studying it on a small scale, but he had seen enough and heard enough of the necessities of the manufacture to be able to confirm what Mr. Hawes had shown of the great room for scientific improvements. He believed, however, that since the removal of the duty some improvements had been introduced, and that we were now not far behind the French manufacturers. Five years ago he visited one of the largest soap-works in the head-quarters of French soap making, Marseilles; neither the chemical nor mechanical arrangements were especially good; indeed, the only striking objects were the workmen, who, working in the heat with their shoulders bare, were as fine specimens of men as he ever saw. With regard to the chemistry of soap-making, his friend Mr. De la Rue had so clearly stated the present most generally received theory, and with so much greater authority than anything coming from him on this chemical subject would have, that he

need not occupy the meeting with any remarks on this head. To what Mr. Hawes had said on the future of soap-making, and the present waste of glycerine, he begged to add his confirmation. Late inventions seemed to make it probable that grease would find its way into the soap pan, only in the state of fat acids; or that if glycerine were ever present, it would be as an addition to the finished soap, on account of its softening action on the skin. Of the future of glycerine, he would only say, that it brightened daily—every day appearing to bring forward new uses for pure glycerine.

Mr. DUGALD CAMPBELL, F.C.S., wished to make a few remarks upon one or two points discussed in the paper. As a chemist, he differed materially from Mr. Hawes in the statement with respect to glycerine—namely, that a portion of the fatty matter, during the process of saponification, was converted into this substance, and that it did not exist originally in the fatty matter employed—and he might say that all scientific experiments hitherto were against that view. The experiment which Mr. Hawes had exhibited that evening to substantiate his theory, he (Mr. Campbell) considered was *refuted* entirely by those which Mr. De la Rue had said he had performed elsewhere, and which he did not doubt to be correct. Before leaving the subject of glycerine, he must say that he should be sorry if the meeting separated with the impression that glycerine was a waste product, for it was a most valuable one, and far more so than soap, or any of the materials from which soap was made. He wished Mr. Wilson, as he was a large producer of this article, while speaking upon the subject, had detailed to the meeting the numerous applications it had, and its money value, which could not be under 4s. per pound. Mr. Hawes had stated, truly, he did not doubt, that he was in the minority in this Society in the view he had taken upon granting patents for inventions, which was that they were injurious both to the patentees and to the public. Now, he (Mr. Campbell) ventured to say that in every society over the civilised world he would find himself in a similar position. Upon what grounds Mr. Hawes had ventured to make this assertion it was difficult to conceive. How had many of our poor men risen to be great men? he need not name them—they were numerous—but by inventions, which had been secured to them by patent-right, otherwise they would have been plundered of them by some of their more opulent neighbours, who had the means to make use of them, whilst they had not. Even under our laws, this was done to a certain extent now. That invention was to a state a great prosperity could not, he thought, be doubted, and to foster it seemed the great aim of every progressing nation; and in no other way did it appear likely to him to be advanced but by patents, easily, cheaply, and effectually secured. As a proof of what he asserted, he might allude to what had been doing in this matter lately in other countries. In Belgium, for instance, by a late enactment, patentees only paid 10fr. for the first year of their invention, 20fr. for the second, and so on increasing every year by 10fr. The Minister of Agriculture, Commerce, and Public Works, in France, no doubt at the suggestion of the Emperor, who saw the benefit the country had received from the acts in the same direction by his late uncle, had addressed a circular to the different Chambers of Commerce in France relating to the modification of their now existing patent laws. This had been replied to by the *Société des Inventeurs et Artistes Industriels* agreeing, in a great measure, with the views which were to secure and cheapen inventions, the payments to be made upon the principle legalised in Belgium. The Commissioner of Patents in America, in his annual report to the Speaker of the House of Representatives, had recommended a great modification of their system of granting patents. He alluded to the large fees which were paid for patents in this country, and referred to the great benefit which a country derived from inventions, advising that every liberty and security should be given to those men, upon

whom the elevation of a country greatly depended. The documents to which he had referred were published in the *Commissioners of Patents' Journal* of this country of the 11th, 14th, and 18th of March of this year. When speaking of the circular of the French Minister, he omitted to state that so much benefit did he consider inventors to be to society, that he would go so far as to grant to those who could not find the funds for the first annual payment, six months to enable them to procure it.

Mr. ROBERT LOW said he could add but little to what had been already stated on the subject before the meeting. He belonged to the class called manufacturing perfumers, who adopted the processes so clearly and forcibly pointed out by Mr. Hawes; they merely re-worked the manufactured article, and they produced the quality called fancy soap. He thought Mr. Hawes had been too modest in his mention of what had been done by his predecessor, his respected father, in the finer descriptions of soap. He was one of the first manufacturers of the curd soap, which perfumers had used very extensively since that time; and had it not been for the great ingenuity displayed in the manufacture of soap, they would not have had the quality of article they now had.

Mr. WINCHESTER said he would mention one use to which glycerine had been applied, as important, he believed, if not more so, than any hitherto brought to the notice of the Society, viz., the preservation of vaccine lymph. A small portion of glycerine mixed with recent matter would preserve it in a moist and perfectly pure state. Mr. Cheyne, who introduced this method, had, for the sake of experiment, kept lymph, so prepared, for some months, and on using it, found it as efficacious as if it had been just taken from the arm. The difficulty of obtaining a supply when most needed, together with the too frequent failure attending the use of dry lymph, tended greatly to favour the spread of small-pox, and to curtail the usefulness of vaccination. The full benefit of the Compulsory Vaccination Act could not be obtained unless the supply of vaccine lymph was equal to and ready at the instant of demand. By preserving it in this way the supply might be rendered inexhaustible. Anything, therefore, which tended to facilitate vaccination, and thereby either altogether prevent or modify small-pox, must be considered a public boon. Such was glycerine in this application of it.

The Earl of CAITHNESS said, from what they had heard that evening, it appeared that the price of soap had been reduced so as to be within the reach of the poorest classes—a great blessing in a sanitary point of view. If by the aid of science they could find a means of still further reducing the price of that important commodity, so much the better, both for the manufacturer and the user of the soap; and he trusted that science was not so far behind in the present day as not to be able to find some more perfect way of producing an article at a cheaper rate than the soap they at present used. With regard to the excise duties, he believed the opinion was very general that they were irksome and disagreeable. The excise, however, in many instances must be exercised for the benefit of the country, and for the maintenance of its revenue. For instance, there was an article which was very largely imported from his country—whiskey; every one, no doubt, disliked the excise duties upon that, but he was afraid the revenue would be a great loser if the excise were taken off it. At the same time, he must say that the taking the excise duty off soap had produced most beneficial results, as had been shown in the paper read that evening, and the more the Excise could be taken off all articles that conduced to sanitary purposes the better. There was another article he should like to see the duty taken off entirely, that was paper. He thought the duty upon paper was a damp upon the instruction of the poorer classes, and indeed of all classes of the community, and operated against its improved

manufacture; and if he had any word in the matter, he should certainly vote in favour of taking the duty off paper, and he hoped before long that it would be effected. They had to thank his brother-in-law, Lord Duncan, for the repeal of the window duty, which was a great sanitary comfort to all classes, because they might now have a house with as many windows as they liked, without a dread of the duty. Still they must look to the maintenance of certain excise duties, otherwise the revenue would not be kept going. He would beg to ask one question of Mr. Hawes, which was as to the difference in value in the manufacture of soap between barilla and kelp. He asked the question because he was personally interested in the manufacture of kelp. To those who were located on the coast of Scotland knew what was formerly the value of kelp. Some years ago, his grandfather realised as much as £21 per ton for kelp, and, as might be supposed, it brought him in a very considerable revenue; and he knew a gentleman on the west coast of Scotland who, he believed, realised as much as £10,000 a year from kelp alone. That gentleman, owing to kelp being dispensed with, was, he might say, almost ruined; and it had made a considerable difference to many proprietors on the coast of Scotland—in fact, on all coasts producing kelp. He did not say this from any wish to deteriorate the value of barilla, or to prevent the use of an article that was best suited to the manufacture to which it was applied, and he should be sorry if the manufacturers did not use the best article, but he should like to hear, from so good an authority as Mr. Hawes, the difference in value of the two commodities in the manufacture of soap. With regard to the Patent Laws, he thought, with Mr. Campbell, that they were in many respects of great advantage, although, perhaps, there were strong arguments in favour of their entire abolition. Still he thought it a hard case that a man who was an inventor should not have some slight protection by paying for it, which went to assist the revenue of the country. He thought every one ought to have some short time allowed to gain something by his brains. A man could not be expected to work for nothing, but he looked to be paid for what he did; and, therefore, it seemed to him a hard case that a person who was an inventor should not be allowed some trifling protection, limited, if they chose, to a short period, but sufficient to enable him to perfect and bring out an invention of his own, till it came to be in a workable condition, when he might either give it to the public or make something of it if he could.

Mr. WIBROW thought Mr. Hawes could not have forgotten one circumstance, showing the operation of the patent laws upon the soap trade. The price of Doe's patent iron frame was originally eleven guineas, but as soon as the patent expired they could be obtained for four guineas—the enormous difference in price being attributable to the patent.

The CHAIRMAN then rose to propose a vote of thanks to Mr. Hawes for his interesting paper. In so doing he could not help referring to one portion of the paper, and also to the observations that had followed upon it, which were not strictly connected with the subject under consideration—he alluded to the remarks upon the patent laws, which had led to several digressions from the subject of the evening. As, however, such digression had been permitted, he could not sit down without joining in the expression of opinion with those few who happened to coincide with him, for, like his friend Mr. Hawes, he was one of a small minority on this question. He did not agree at all as to the advantages of patents. He quite agreed with the noble lord who had spoken, as to the desirability of protecting, as far as possible, a man's property, whether it was in the power of invention, or any other good thing that was within him, and still more would he protect, in every possible way, the property in inventions of those who possessed but little other property—the powers of the inventor and the ingenuity of the

workman, but having had some considerable experience with patentees, manufacturers, and workmen, he was of opinion that any practical benefits derived from the patent laws did not compensate for the injury inflicted. He believed, on the contrary, that both the inventors and the public greatly suffered from the attempt to protect inventions. He had had great experience on this subject, being compelled daily to examine inventions of various kinds, and having himself constantly to invent in the occupations in which he was engaged. Having, then, all his life been connected with inventors and workmen, he had witnessed the injury, the waste of mind, the waste of time, the excitement of false hopes, the vast waste of money, caused by the patent laws, in fact, all the evils which generally resulted from the attempt to protect that which did not naturally admit of protection. He agreed as to the abstract desirability of protecting inventors in some way, provided it did not foster unhealthy invention, as he thought it desirable to protect every species of property that existed. He was disposed to encourage every step towards facilitating the obtaining patents; he hoped they would be made dirt cheap, as he thought that that would be the most effectual way of destroying them altogether. Therefore, whenever he had been consulted on the subject of the Patent Laws, he had always advocated the rendering of patents as open and free and cheap as possible; in the first place, because he saw no reason for attaching a price to them, and, next, because they would sooner arrive where the principle would be fully tested. We were already nearly arrived at that state of things when engineers were almost brought to a dead stand in their attempt to introduce improvements, from the excess of protection. He found that he could hardly introduce the slightest improvement in his own machinery without being stopped by a patent. He could mention a striking instance, in which, a few months ago, wishing to introduce an improvement that he thought would have been valuable to the public in a large work on which he was engaged, he had no sooner entered upon it, with a willingness to incur considerable expense in the preliminary requirement, and in the trial of it, than he was stopped by a patentee; but he was fortunate enough to find that another patentee existed of the same thing, and a week after a third appeared. There was thus, fortunately, a probability that, by the destruction of all value in any of the patents, he might be able to continue the improvements he was desirous of introducing. He concluded by moving a vote of thanks to the author of the paper.

Mr. HAWES returned thanks. He would briefly advert to one or two of the observations which the reading of the paper had elicited from gentlemen who had taken part in the discussion. In the first place, he would endeavour to give the noble lord the information he desired with regard to the relative value of barilla and kelp in the manufacture of soap. He might say that barilla was no longer an article of commerce; the cheapness of alkali made from common salt had destroyed that trade. But kelp might be regarded not so much as an article used in the manufacture of soap, as producing other substances cheaper than they could be obtained elsewhere; for instance, from the weed-producing kelp, a large quantity of that useful article, iodine, was produced. But the value of kelp must always remain comparatively low, because the value of salt was low, and he thought it useless for the landlords of Scotland to expect that a large income would be again derived from that source. This was one of the penalties paid by the few for the benefit of the many, which they must be content to submit to, and he thought the noble lord would be the last to wish restrictive laws to be placed upon alkali.

The Earl of CAITHNESS would mention the difference of price in the article of kelp,—whereas formerly the price was £11 per ton, it was now only about 11s. per ton.

Mr. HAWES added—With regard to the observations that had been made with respect to patents, he would say nothing after the remarks of his friend the chairman. He thought this subject was generally viewed from the inventors' side only. To compare great things with small, he might characterise the former Corn Laws of this country as the agricultural patent for the benefit of the few to the injury of the many, and in like manner every patent was a price paid by the public to the inventor. With regard to the glycerine question, he could not admit that he was wrong in his theory because certain authorities were against him. He thought there was room for research and enquiry whether the formation of glycerine could not be altogether prevented, or whether it could, upon production, be turned to more profitable account than was at present the case. Such experiments, however, could not have been carried on whilst the excise upon soap was in operation.

The Secretary stated that the Paper to be read on the evening of Wednesday next, the 2nd of April, was "Description of Improved Apparatus for Teaching Mechanics in Schools," by Prof. Willis, F.R.S. On this evening Sir John Rennie, F.R.S., will preside.

EXAMINATION OF CLASSES IN INSTITUTES.

HANTS AND WILTS ADULT EDUCATION SOCIETY.

At a meeting of the Committee, held at Basingstoke, on the 19th March, 1856,

It was resolved,—That subject to the following conditions, a sum not exceeding £1 be allowed for travelling expenses to members of Institutions in Union with this Society, who may be desirous of presenting themselves for examination at the Society of Arts in June next.

CONDITIONS.

I. That, during six months at the least, the candidate shall have attended a class or classes of instruction in his Institution, if any such classes have been held.

II. That, on or before the 15th of May, he shall send a written notice of his intention to present himself for examination, and in what subjects, addressed to the Hon. and Rev. S. Best, The Rectory, Abbott's Ann, Andover.

III. That, together with the aforesaid notice, he shall forward a certificate, signed by the President and Secretary of his Institution, attesting, 1st, his respectability and general good conduct; 2ndly, his fitness for examination in the subjects he selects; and 3rdly, stating their belief that the assistance offered by the Society is of importance to the candidate.

Colonial Correspondence.

THE NATURAL RESOURCES OF BRITISH HONDURAS.

Belize, British Honduras.
Feb. 15, 1856.

SIR,—In the last letter which I had the honour of addressing to you, I brought under your notice a favourite fish in this part of the world, and caught in the waters of this hemisphere, called the callipever. If I recollect rightly, I pronounced a rather glowing eulogium upon its merits,—an eulogium which might appear to be prompted by the imagination, rather than suggested by the reality. I do not, however, feel disposed to retract a single syllable from what I then said, but, on the contrary, I am prepared (I think) with evidence in support of its correctness. But of this you must judge. I have sent you six of these fish, caught and cured by the Spaniards. Although it is impossible, in their salted state, to form anything like an accurate opinion of their flavour when newly caught, they

are still far superior, when cured, to the cod and ling of England and Newfoundland; the latter being dry and coarse, and the former fat and delicate. I am not sure, if the callipever, when fresh, were preserved in oil, that it would not be equal to the tunny fish of the Mediterranean, which is so highly prized by gourmands, especially on the Continent. There is not the slightest doubt that the callipever may be caught at certain seasons of the year in immense quantities at the mouths of all the principal rivers in British Honduras. The largeness of the roe alone indicates that it must be a plentiful fish. I am sure that a valuable callipever fishing might be established here. "There is as much fish in the sea as ever came out of it," is an old saying, and it is a true one when applied to oviparous fishes, which no extent of deduction can exhaust. It may not be so in reference to certain cetaceous fish, which might probably be driven by constant depredations from one sea, to seek repose and quiet in waters less frequented, as it is said the whale, from the continual invasion of its ice-girt home, has forsaken the Greenland seas, and swam for refuge to some unknown deep.

I also spoke of the roe of the callipever, and described it as being in my opinion equal to caviare. Caviare is made of the roe of the sturgeon, the *sevruga*, the *beluga*, and the *sterlet*, fishes which are caught in the rivers and lakes of Russia. There is a great sturgeon fishery at Pillau, in Prussia, large quantities of that fish being caught in the *Haff-curische*, and the *Haff-frische*. The finest caviare is said by some to be made of the roe of the *sterlet*, which is very plentiful in the rivers which flow into the Caspian. Others give the preference to that which is made of the roe of the *berluga*, which is caught in the *Volga*. A caviare is made in Norway, from the ova of the porpoise, but is only suitable for a Norwegian stomach. The great mart for the best caviare is undoubtedly Russia, and that delicacy, according to McCulloch, is one of the principle articles of her trade. Now, I really think it is desirable, whilst we are at war with that country,—a war which, notwithstanding rumours of negotiation, and whisperings of peace, presents as yet all the diagnostics of durability,—that we should cast about in our own colonies, and endeavour to discover amongst their various productions, marine and terrene, articles similar to those which have constituted her trade with Great Britain. In the course of my correspondence with you, which you have kindly thought not unworthy of a place in your *Journal*, I have stated three articles forming a part of the Russian imports into Great Britain, which this country is capable of producing to a very considerable extent, namely, pitch, oil, and hemp. No reader of modern history is unacquainted with Napoleon's "Continental System," by which he hoped to impoverish the British nation by ruining her export trade; a vain expectation, which proved that he was completely ignorant of the internal wealth and resources of that country. The wealth of Russia, her means of existence as a great power—it is universally admitted, depend upon her exports; and, if it be our duty at the present time to close and barricade all her doors, and shut up within herself all her natural and manufactured productions, it is equally our duty to endeavour to supply from our own resources that deficiency in articles of necessity or luxury as such a course of conduct is calculated to occasion. If we succeed in this attempt we shall not only be able to supply our temporary wants, but we shall be, in a great measure, independent of the markets of Russia when peace shall have been happily restored, and thus our own dependencies will be permanently irrigated by means of the new channels which the current of trade will have dug. I have little doubt that many of our colonies contain vast stores of mineral and vegetable wealth, which only require energy and enterprise to develop. But it unfortunately happens that when once a particular trade, or manufacture, has been established in a country,—originally, perhaps by accident, it is thought that that country is unfitted for

any other branch of commerce, and the people go on treading in the footsteps of their fathers, and moving in the same line, with as much exactness as a carriage on a railway. Mahogany has always been the staple commodity of Honduras, therefore, it can produce nothing else. Sugar and rum have been the products of Jamaica, therefore it can produce nothing else; this error exists to a great extent in every part of the world. But it is an error, for there is scarcely a country under the sun which, by skill and industry, may not be made to yield a great variety of valuable materials to contribute to the natural wants and artificial appetites of man. Now is the time, then, when every person possessing wealth and influence in our colonies, should apply a portion of that wealth, and exercise that influence, in bringing forth from the earth the many stores which nature has concealed within her womb, and which only await the obstetric hand of cultivation to spring up in rich variety. It has always appeared to me that those who are intrusted by the crown to administer the affairs of our colonies, are more intent upon loading the tables of the Houses of Assembly with projects of law, and of proposing impracticable theories, than in directing the attention of the colonists to those pursuits and occupations which would be far more profitable to them than frothy harangues and newspaper philippics; than in awakening a spirit of inquiry, arousing a feeling of competition, and kindling an energy of mind in respect to those substantial matters in which their real interests lie—on which their prosperity, independence, and happiness depend. In every colony, if one article of trade be exhausted, there will always be another to supply its place. If a channel of commerce be dried up in one quarter, a new fountain will bubble up in another. What does it signify that the mahogany trade of Honduras is at its last gasp? There are thousands of other materials that will fill, and more than fill, the vacuum which would be caused by its demise. What does it signify that Jamaica has been beaten by Cuba and the Brazils in sugar and rum? The soil of that beautiful island can produce hundreds of valuable materials beside the cane, and beneath its surface there are rich veins of copper.

I have said that I have already brought under your notice three productions of this country similar to some of the articles which form a part of the Russian trade; I now mention a fourth—the roe of the callipever. The mode of curing this delicacy differs widely from that in which the roe of the sturgeon and the *sterlet* is prepared. The following is the account given by Goldsmith, in his "History of the Earth and Animated Nature," of the way in which the latter is manufactured:—"They take the spawn, and, freeing it from the small membranes that connect it together, they wash it with vinegar, and afterwards spread it to dry upon a table; they then put it into a vessel with salt, breaking the spawn with their hands, and not with a pestle. This done, they put it into a canvas bag, letting the liquor drain from it. Lastly, they put it into a tub with holes in the bottom, so that, if there be any moisture still remaining, it may run out; then it is pressed down, and covered up for use."

Very different is the manner adopted by the Spaniards in this country in curing the roe of the callipever. They do in this wise:—First, they rub the roe well with salt and a little nitre, then they put a number of them one upon another, and compress them by means of a heavy weight. After this, they make a kind of altar of green boughs, covering the top also with green branches traversing each other. The inside being filled with straw and fresh leaves, which are ignited, they place the roes on the top, and cover them well up likewise with green boughs. They are allowed to remain there six or seven days, during which time the fire keeps smouldering and sending up a thick smoke, which is concentrated upon the roes by the upper layer of branches. This they call barbecuing. The membranous covering of the roe is not taken off, consequently it will keep for a long time, the air being entirely excluded

from it. When the roe is eaten, it should be cut in very thin slices. The outer coating should not be taken off, but rubbed clean with a dry napkin. I have sent a dozen of these roes, in order that you may form an opinion of them.

Having spoken of the fish, and of the roe which it contains, I must now make some observations respecting the scales of the callipever. These are rather larger than a sixpence, and in the form of a horse-shoe. They are of a pearly whiteness, and when held to the light they exhibit a series of veins resembling the water-marks in paper. I have thought it not impossible that these scales might be made available for inlaying in cabinet ware and *papier maché*. They may be entirely worthless; but, at all events, I see no harm in bringing them to the notice of your Society. I send you by this packet a small box of them.

A pretty good trade in peltry might be carried on in this country. The immense forests of British Honduras are plentifully stocked with animals, *feræ naturæ*, of many descriptions. The cougar, the jaguar, the ocelot, the ant bear, and the silver fox, are a few of the principal. The cougar is by some called the American lion; by the inhabitants of this country it is known as the red tiger. A full-grown cougar is not much inferior in size to a Bengal tiger. The colour of the skin is similar to that of the lion, but a little redder, and it becomes white towards the belly. A darker streak runs down the back and the middle of the tail. It is a very fierce animal, and never hesitates to attack man. The flesh of it is eaten, and is said to be agreeable food. The injunction of St. Paul, "to eat what is set before us, and ask no questions for conscience sake," would hardly be a safe maxim to act upon in this country, at an entertainment given "under the greenwood tree," by the "Ancient Foresters" of Honduras. The sylvan dainties would not be composed of precisely the same materials as a *petit diner* at the *Trois Frères* or the *Café de Paris*. The jaguar, which is also called a tiger, is in size between the Asiatic tiger and the leopard. It is spotted, but not in the same manner as the last-mentioned animal. The spots are not round, but in different shapes, some being longitudinal, some shaped like a horse-shoe, and some triangular. These marks are a glossy jet black, and they look very lustrous, sprinkled as they are over a ground of a bright reddish yellow. The jaguar exists in great numbers in Honduras, and it is not unfrequently killed close to the town of Belize. Hogs are a great temptation to him; and wherever there is a swinish settlement, a jaguar is sure not to be far off, *with a sty in his eye*. Although a formidable brute, he is not courageous, and will never attack man if he be not molested—nay, he will even fly from his approach. What amiable qualities, what desire for human acquaintanceship, hunger might develop, I am not able to say. But hunger is unknown in this country; for quadruped and biped there is enough, and more than enough. To the soaring pelican, who with "fell swoop" dives headlong into the wave with unerring aim for his scaly prey, to the cougar and the jaguar, who pounce, in their well-stocked woods, upon the heccary, the antelope, and the deer; to the turkey buzzard, vulgarly called the "John Crow," who plunges his foul beak into the rotting carcase; to man, who, without leave or license, seizes an acre or two of crown land, and plants therein his yams and plantains, to be exchanged in the fulness of time for "gin and baccy," hunger is unknown. Scarcity is doubtless an evil; but is the entire absence of want an unmixed good? No country can become great, virtuous, and rich, which produces the necessities of life with little or no labour,—where the Juba tree of the Mohammedan Paradise may be said to grow, from the branches of which hang in tempting clusters the most delicious fruits—ducks roasted to a turn, and turkeys stuffed with truffles—coats and waistcoats, hats and umbrellas. Labour is a condition of prosperity and happiness. Where there is no want, there will be no labouring class; and where there is no labouring class, there will be no progress. Where there is no neces-

sity for industry, there will, of course, be indolence, and indolence is the nurse of every vice,

"For Satan always finds some work
For idle hands to do."

This is very much the condition of Honduras, and, I believe, of many of our West India colonies. It does not fall within my province at present to trace the causes of this deplorable state of colonial affairs; but I should have little difficulty in performing the task, if I were to set about it. To return to the jaguar. I said it was not naturally a courageous animal, although of great size, possessing vast muscular strength, and furnished with a full complement of tusks, teeth, and sheathed claws. Some years ago, I went with my family to reside for a month or two at a cattle-pen on the Settee river, which is about forty miles to the southward of Belize. The house in which we "located ourselves," as our dear brother Jonathan would say, was a large wooden structure, seventy feet long and forty wide. In this capacious dwelling there were only three rooms—a sitting apartment, which ran along the whole front of the building, and two bedrooms behind, with a passage between them. The situation was most romantic. A large space of ground, consisting of about twenty acres, was cleared round the house, which was shaded by the stately mountain cabbage, the plumelike cahoun, the umbrageous fig, and the tall, widely-spreading, wild cotton tree. On the west were the mountains, covered with dense forests, where the human foot had not trodden for centuries, the contemplation of which could not fail to awaken strange mysterious feelings, and give rise to various speculations and conjectures. What was on the summit of those distant hills, and what kind of country was beyond them? What unknown trees and plants did those forests contain? Were there any structural remains of man's handiwork? Were there any vestiges of a race long since departed from the earth? The native Indians, and the Negroes as well, have an odd idea about those forests. They believe that they are inhabited by a race of people with strange features, and faces looking backwards—a sort of

"Anthropophagi, and men whose heads
Do grow beneath their shoulders."

At our feet flowed the river, as it had flowed hundreds of years ago, and as it might flow perhaps hundreds of years hence, when some philosopher probably would stand upon its banks and speculate on our fossil remains, here and there dotted with little islets, some of which, like those of Pactolus, were covered with golden sands, and some with a very fine white gravel. In this retired spot, when the shades of evening began to deepen around us, numberless were the sounds which fell upon our ears from bird, beast, and insect. One evening whilst we were availing ourselves of the short interval between sunset and thick darkness, by taking a cool walk, we were suddenly startled by a noise like distant thunder, which appeared to come from the earth under our feet. We rightly conjectured that it proceeded from a tiger, which animal we imagined must be in a jungle about ten yards off. Fear, which exaggerated our danger, very fortunately did not paralyze our legs, but, on the contrary, imparted to them extraordinary agility. After we were safely housed, we were informed by the cattle-man that it was really a tiger which we had heard—that it was at least a mile off—that it was tempted by the calves which were confined in an inclosure under the house, and that no doubt at night it would endeavour to appropriate one of them for its supper. This man had a little Scotch terrier, one of those saucy-looking curs such as Landseer has so admirably represented in his picture of "Impudence and Dignity." We did not fail to make all the doors and the windows perfectly secure, for the idea of a tiger breaking into the room at the dead of night, and carrying one of us away *à la Munro*, was not productive of agreeable sensations. So as we wanted

"none of his jaw," as I said before we made all fast. About midnight the prophetic words of the cattle-man who verified. Our growling friend paid a visit to the calves. Being all locked up, however, there was no fear that the awful tragedy of Red-riding Hood and the Wolf, *mulatis mulandis*, would be repeated for the benefit of the jaguar. It made several furious attempts, by rushing against the door with all its might, to procure its anticipated veal, but the fatted calf was not destined for such a prodigal. An unexpected actor appeared upon the scene. This was no less a personage than the Scotch terrier. He went most audaciously up to the jaguar, and by dint of barking, snarling, and snapping, at length drove him fairly from the field. I do not like to make invidious comparisons, but I think the exploits of the celebrated dog Billy, which adorn the historic page, must sink into insignificance when compared to this achievement of the Honduras cattle-man's terrier. One single blow of the tiger's paw would have crushed the little animal. But that blow was not made, and the cowardly giant sneaked away from the gallant dwarf. Similar occurrences take place every day, when, instead of the *flesh* the *skin* is only deserved.

"Thou wear a lion's hide! doff it for shame,
And hang a calf's skin on those recreant limbs."

In the morning I had an opportunity of judging of the size of our veal-hunting visitor. He left the impress of his paw upon the soft clay, and from its dimensions there could be no doubt he was one of the largest of the species.

The ocelot, or cat-a-mountain, or tiger-cat, for it is known by these different appellations, is a much smaller animal than the jaguar, but it is a great deal fiercer. It is, indeed, a very dangerous beast to fall in with. Whether molested or not it will attack a man, and even follow him up a tree, if he should resort to one for safety. The spots upon its skin are similar to those of the jaguar, but the colour of the ground varies. Sometimes it is a reddish yellow, and sometimes a dull grey. I have sent you the skin of one of these animals, as well as one of a small cougar.

The calabash tree of this country, of which there are several kinds, supplies to the natives, in a very great measure, the place of the potter. The fruit of this tree is surrounded by a thick, woody shell, which is applied to a variety of purposes, such as basins, drinking cups, bottles, &c. They are sometimes carved and ornamented by the Indians with that sort of artistic skill peculiar to savages, whose ideas of the beautiful might be open to some objections, and whose tools are extemporised out of bits of bone, sharp flints, and other accidental materials. I have sent you a number of these calabashes so ornamented, which may be considered curious if nothing else.

The Indians of Guatemala manufacture a rude pottery out of the red clay of the country. The vessels which they fashion are of various forms and sizes, but the purpose to which they are applied is, for the most part, that of cooling water, to which they are admirably adapted, from the porous nature of the substance of which they are composed. Some of these vessels are not without a certain degree of classic elegance, at least in the design, which, to say the truth, is but clumsily carried out in the execution, and all of them have the stamp of the days of old. I suspect that the fashion, uses, mode of manufacture, and the material of which these vessels are made, are strictly traditional. I have little doubt that they have been transmitted, unaltered and unimproved, from a very early period. The Indians of the present day are a degenerate and uncultivated race, and are quite incapable of any new invention. They can only do what their fathers did before them, and that in a ruder and much more inartistic style. These utensils then, may, I think, without any very great sketch of imagination, be considered to be not very dissimilar from those which were made by the ancient Egyptians or Phœnicians, and the mode of manufacturing them is probably the same now as it

was centuries ago. I have sent you a few of them, although, perhaps, they are not strange to you.

There are many remains, in different parts of British Honduras, of towns, temples, and of a people which existed ages ago. There can hardly be a doubt that the continent of America was very numerous inhabited by a highly civilized people, many hundreds of years anterior to its discovery by Columbus and his successors, at which period there is reason to believe that the natives had greatly retrograded from the moral and intellectual status of their ancestors, and only exhibited the relics of a decayed mind, the shreds and patches of a worn-out intelligence. How that vast continent came originally to be peopled, is a question which has often been asked, and often attempted to be answered, but it is a fruitless inquiry.

There are many ways in which the inhabitants of the Old World could have been conveyed thither. It is not at all necessary to resort to the doctrine of the ethnologists, that the Indians of America are a separate race, and have a different descent. The correctness or incorrectness of the Mosaic account of the creation need not be discussed in reference to this question. But, in whatever way the country became known and peopled, known and peopled it unquestionably was, at a very early period. The town of Belize is called from the river on which it is situated, which, it has been said, derives its name from a famous Scotch pirate, rejoicing in the patronymic of Wallis, who rendered himself, in the good old buccaneering days, notorious for his daring exploits in these seas. The W, somehow or other, got changed to a V, and then the Spaniards always pronounced the letter V like a B; hence Baliss, Balize, or Belize. This etymology has been adopted by Mr. Montgomery Martin, and almost every other person who has put pen to paper for the purpose of describing this country, without any inquiry as to its correctness,—and without any satisfactory evidence that the *elymon* himself ever had an existence. What will these gentlemen say, when I tell them that this derivation is an entire fiction? The late Mr. Wright, who was for many years a mahogany cutter in Honduras, and grew rich by that trade, at a time when a person might in this country "cut his stick" to some purpose,—was a man of considerable ability, and coming from an island which has been called, in the language of song, both a "gem" and a "flower," he was sometimes a little more ingenious than authentic. He it was, I have reason to believe, who first introduced Mr. Wallis to the notice of the public as the proud individual to whom Belize was indebted for a name, the said individual never having any "local habitation" whatsoever, it is supposed, except in the Milesian imagination of Mr. Wright. Besides, it is an undoubted fact, that rivers and mountains never lose their ancient names, which are given to them because of some peculiar feature or characteristic existing in themselves, or on account of some extraordinary event having taken place in their immediate neighbourhood. For instance, you may have Deep River, Great River, Black River, or a river called after some battle which had been fought, or after some deity, but it is not at all likely that the aborigines of a country would have discarded the ancient name of a river, to call it after a modern name. Now the Indians always say the "Belize river." Mr. Kennedy, who was for many years a judge of the mixed commission in Havana,—a gentleman of remarkable intelligence, and a good antiquarian, conjectures, with much appearance of reason, that the name Belize is derived from the two words Baal, Bal, or Bel, all signifying the same deity, and Itza, a city, or place; and that Belitza was given to the river in consequence of a statue of Bel having been there erected, or a temple dedicated to that deity. In Guatemala there is a town called Ysabal, from the river beside which it is built. This is the same word transposed. Ysabal is Itzabal, or Bal-Itza. Bel, signifying the sun, was a Phœnician deity, as Osiris was Egyptian. These names, then, and many of the remains which are found in this

country, render it extremely probable that a great part of Honduras and Yucatan was colonised by the first-mentioned people—a party of whom, sailing as they did in those days, before the invention of the compass, by the sun and the stars, might have drifted, during a tempest, whilst those luminaries were obscured, into another hemisphere, and beheld, with astonishment and awe, when, after many days, the winds sunk and the skies cleared, new constellations, a more effulgent moon, and a more glorious galaxy than those which shone upon their Eastern home. Relics of different kinds are constantly being found, such as portions of edifices, arms, legs, and heads of images, vases and spear-heads. At a place called Corosal, in the northern part of this settlement, these remains more particularly abound. None of those which I have seen appear to have been sculptured, but moulded out of the clay, and baked. I send you the head of an image which was discovered at Corosal. It has been formed by the hand, and baked in the fire, the marks of which, notwithstanding its antiquity, may be observed under the chin. The features resemble those of the Indians of the present day. The head is represented as being within the jaws of a wild beast, most likely a jaguar, from the roundness of the forehead and the shape of the ears. From the closed eyes and protruding lips of the human face, the man is evidently intended to be dead, and the placid and rather smiling expression of the countenance is that which has been often observed upon the features of those whose death has been occasioned by pressure upon the spine.

I have sent you two bags of the ground-nuts, or pindars of this country.

I have, &c.

R. TEMPLE.

Home Correspondence.

PATENT REFORM.

SIR,—My opinion has been asked as to what would be the effect of throwing open to the public provisional specifications at the end of four months?

The first and obvious result would be, limiting to four months instead of six, the period for specifying. If the patentee were poor, he could not safely avail himself of the latest period for sealing, for, unless he sealed before publication, he would be exposed to the machinations of unscrupulous wealthy rivals.

The object of the provisional specification is to fix the identity of a new invention at the time of getting protection, and prevent interference with others who may come after him. But the provisional is not a final specification, and, if thrown open, all kinds of squabbles would ensue in the interpretation by others.

It may happen that after a man has taken a provisional specification he finds he has omitted something. In such case he will apply for a new provisional specification and abandon the old one. To a poor man sufficient time is very important. The rich man would prefer a law for putting in a specification complete, just as he would prefer high fees, because he can afford to waste money, and that puts his poor rival at a disadvantage.

The provisional specification fixes an idea. It does not prevent a patentee, with an original idea, from also provisionalising. It is true that he may provisionalise the same thing that some one has locked up in a previous provisional, but that must be the fault of the officers who examine, and in such case he should have his expenses returned to him, as being a false grant of what he had no means of ascertaining for himself.

The length of time may be too long or too short, but assuredly the secret should be kept till the man gets his right completed.

I think, however, that a discretion might be exercised as to prolonging the time allowed for specifying to an in-

ventor desirous of keeping clear of some one immediately before him, and also of allowing a few months' extended time to the patent, to compensate for his unavoidable loss of time.

It is obvious that, notwithstanding the provisional specification is intended to secure a right, few people trust to it, but keep their secret till they have specified.

With regard to the cost of patents, it is a mistake to suppose they are cheaper under the New Act. It is true that a man gets a patent for the three kingdoms for £170, but he could, before the alteration, get a patent for England and the colonies for £120; and, in very many cases, Scotland and Ireland are of little importance. Nay, sometimes it was an advantage to leave Scotland and Ireland open to the public, as it stimulated the introduction into England. But, beyond this, for his £120 he got a patent for a series of improvements; for example, a very common title was, "Improvements in railways and engines and carriages to run thereon, applicable to other like purposes." Under this title, for England, came rails of any number of kinds, switches and crossings, turntables, station roofs, signals, lamps, couplings, wheels, axle-boxes, springs, buffers, carriages, boilers, pistons and cylinders, fire-boxes, engines generally. Under the present system, this would involve some eight patents, amounting to £1,360; while, formerly, the utmost cost for the three kingdoms was about £380. It is true that patent agents allege that such patents were "omnibus patents," and unsafe, but their interest speaks in the matter. With Lord Brougham's Act of Disclaimer, the patent, if *bona fide*, and carefully drawn, was safe enough under any fair system of laws.

Nevertheless, to a patentee with one idea—such a patent as a mere patent agent likes—the patent is cheapened, but to the fertile inventor it is a heavily-increased tax.

There are many more points to consider, but let us begin at the beginning.

A patent monopoly is granted in the supposition of something new and useful to the community.

What is new?—"Nothing under the sun." The globe and its materials and modifications date from the creation. What is old or new must be dealt with as a matter of possession. The law says that land out of ownership for thirty years becomes the property of anyone who can squat thereon. The same rule might very well apply to inventions. Anything out of use for thirty years should be considered as practically extinct. The last French recommendation on patents considers ten years' abandonment as an equivalent to non-existence. With the publication of all the patents, a datum line becomes important. If a man with a useful idea, new to him, examines the lists, he will probably discover that it has been patented before, and he abandons it. In this mode the very publication might become an evil to the community, by narrowing the sphere of action. With the recognition as new of all things out of use for thirty years, the Patent Acts may become very valuable "diggins" for inventors, and very advantageous to the public.

The next question is, the process of granting, whether by previous examination, or at the patentee's own risk. I incline to the latter, for the purpose of preventing all imputation of unfairness in what is supposed to be a secret. But after specification, the patent, or such parts of it as were infringements of previous patents, should be, with notice to the pseudo-patentee, struck off the lists by judges, giving, not their opinions, but their several and joint reasons for so doing.

The cost of the patent, it is clear, should only bear a reference to covering office expenses and the business of publishing. To deny a man the benefit of his own brains on account of his poverty, is a great injustice; and the talk of overlaying the office with rubbish, by reason of cheap patents, becomes void of meaning, if a cheap provision for abolition is made, to get rid of the absurd *scire facias*, an instrument only useful to oppressive people.

With regard to litigation, it is clear that a special Board is required to settle disputed claims. But there is one obvious means of preventing injustice. In case of complaint of infringement, let the complainers be bound to state and advertise their case in the public press, and their intention of applying to the Board of Judges. Let the witnesses be called by the Court, at the instance of the litigants, and paid by the Court, for it is a public as well as a private interest that is at stake. And in case of a manifest injustice, let the ill-doer be saddled with all the expenses. And in case of a wealthy company seeking to oppress a poor man or individual, it should be competent for the Court to amerce in heavy damages, payable to the individual and to the Office.

With regard to the payment of witnesses, as the public is a party to the dispute, the public should pay them, *i.e.* out of the funds of the Office. There are two classes of witnesses—those as to facts, and those as to principles, and there is no reason why they should not be put into the category of an ordinary subpoena. It is a mere mockery of justice for a rich man or company to give high retaining fees to men in position, and debar the poor man of his chance of redress.

The advisable duration of a patent is another question, and also the question of paying fees.

The French report advises a patent for forty years, and a small annual payment, to be collected by the tax-gatherer, so that a man may abandon his patent when he likes. They propose also to give him the exclusive use for 15 years, but to make it compulsory on him to take payment from any one wishing to use it, after that period, of a regulated royalty.

Probably it would be well to classify patents, with this object. The higher class, involving a novel and important idea; and the lower class, involving mere contrivances or manufactures. The former class gets but slowly into uses; the latter, more rapidly.

The character of mind of an inventor—and they are not a numerous class—is sometimes crotchety. Frequently he prevents his own prosperity. But not on that account must we forget that he is a benefactor to the community, and while providing that he should not shut up an invention, we must take care that he be compensated. And it would not be an unworthy use of surplus funds from patent fees to devote a part of them to help unfortunate men who have done the state service.

It is supposed that the surplus is enormous, and many eyes are fixed on it for their owner's own purposes. One purpose seems less objectionable than others—providing for men of science upon whose discoveries many patents have been based. But there is more apparent than real logic here. The true plan is to give the man of science his patent also for his discoveries, and we know that many men of science do so work their brains. Science proper can find many means, in writing books, and it would be very proper to give the first discoverer of a star the sole privilege of publication respecting it for a given time. A geologist or geographer, or discoverer of new land, might also be thus compensated. The first promulgator of new knowledge would have a very enviable practice. What would be the value of the principle of circle sailing to the original discoverer, if all subsequent writers were compelled to pay him toll, or the State to buy him off? If Professor Owen were entitled to a royalty upon all books containing allusions to his discoveries, he probably would be well off. And if Faraday held the right of his scientific discoveries, he might, perhaps, be on a level with railway contractors.

The French report recommends the grant of patents for new financial plans.

Assuming, then, that the Patent Office is established for the benefit of the general community through the agency of inventions, the requirements are as follows:—

First. The publication of all past and present patents of all countries, with translations from the foreign.

Secondly. A public library, accessible to inventors at all

reasonable hours, containing all works having reference to invention.

Thirdly. An assortment of models of all complicated machinery.

Fourthly. The right to a patent when applied for at the inventor's own risk.

Fifthly. The right to be informed, where practicable, that his patent will not be valid, but leaving the taking it to his own option.

Sixthly. A board of judges, or examiners, to strike off the list all such patents, or parts of them, as, when specified, are manifest infringements, or duplicates, with notice to the patentee, thus clearing the office of superfluous matter.

Seventhly. A board of judges to decide on litigated patents, and to subpoena witnesses at the cost of the office, the office bearing the expense out of the accruing funds, on the ground that the patentees have contributed them, and the question belongs to the public as well as to the individual.

Eighthly. That the board shall have the power of amercing oppressive companies or individuals, to compensate the individual and the office.

Ninthly. That every complainant shall publish his statement in the public press for a certain time previous to the decision by the board.

Tenthly. That a patent should apply to all new discoveries in science, and to all arts, manufactures, or inventions not known for thirty years past to be in use, whatever records may exist of them. That in case of discoveries involving the application of principles not before used, the duration of the patent shall date from its first profitable use.

Eleventhly. That the cost of a patent should be determined by the amount of money required to pay the salary of the officers, judges, and publishing establishment, library, &c., and should be raised or lowered from time to time as they might become more or less numerous.

Twelfthly. That the provisional specification be kept secret till the patent be sealed and the full specification lodged.

Thirteenthly. That in case of patentees with similar titles closely following each other, the second should be allowed such extended time for his specification as will enable him to examine the previous one.

Fourteenthly. That the duration should be extended in corresponding ratio from the date of the specification.

The tendency of the age is now to work patents by companies, and the tendency for those companies to oppress individuals, because all law expenses fall lightly on the companies and heavily on the individuals. And this tendency will decrease the progress of invention unless guarded against. In France, invention dates from the first grant of patents by the elder Napoleon. Before that, French invention scarcely existed as a public matter. It has been remarked also, that with the increase of patents in England there has been a decrease of litigation. This may arise from two sources, first, that the publication of patents has prevented mystery; secondly, that litigation is so hopeless that people abandon their right, rather than contest them.

Such laws are a practical denial of justice. Let us either abolish patents altogether and stop invention, or make simple justice a plain and easy thing for the inventor. He pays himself enough taxes to support all the tribunals he requires, and to that purpose should the surplus fairly be devoted. It is believed that the Chancellor and the present Law Officers of the Patent Office would support such a plain system of Patent Law Reform, if it were only fairly placed before them. It would be a proud day for England thus to take the lead in rendering tardy justice to the men who ever labour for the progress of humanity.

I am, Sir, yours faithfully,
W. BRIDGES ADAMS.

MR. HAWES AND THE PATENT LAW.

SIR,—Mr. Hawes, in his paper on soap, last night, commenced with a list of "Patents," beginning in 1622, tending to oppose the soap trade. It would have been quite as candid to state that these were not patents in the modern sense of the term—a monopoly of an improvement—but simply monopolies of a whole trade, granted by despotic power to convenient tax-payers.

Ex-cathedra condemnation of patents and patentees is made suddenly to emerge from a discourse on soap. Mr. Hawes pleasantly assumes, with a patronising look of kindness, that patentees foolishly stand in their own light "by not relying upon their own knowledge and skill for success," and that patents are equally injurious both to them and to the public.

I think it will be found that the opponents of patents are always people in easy positions of business or employment, or capitalists contented with moderate interest in very secure investments. "Let well alone, for we are very well off." Their doctrine comes under the category of preaching general contentment to the poor. The excessive desire to save inventors from injuring themselves, so commonly professed by patent opposers, does certainly savour of over-philanthropy.

Mr. Hawes makes it an imputation on patentees, that capital has been found to take the patents by "persons out of business, and unacquainted with the real state of the case." Mr. Hawes assumes that all the soap patentees but one have been quacks and pretenders, who would not "seek information from those able to afford it," viz., the trade. But how can all this damage the trade or the public? Who is made to suffer, save the quack patentee and his dupes?

Very fortunately for the world, Mr. Hawes is, indeed, in a large and increasing minority in his opposition to patents. The state reports from both France and the United States, both regard inventors as benefactors to the world, and deserving of more help and protection than they have yet received.

Men of science, of genius, and skill, like patents. Dr. Brewster patented his kaleidoscope; Liebig patents manure; Schonbein patents gun-cotton; Watt and Arkwright have been succeeded by numerous others; and in our own day we have George Stephenson and his son Robert, the Maudslays, Penns, Fairbairns, Muntzes, Mackintoshes, and others. In short, every man of genius is desirous to reap the fruit of his own brains in the form of a patent, and even wealthy noblemen do not disdain it.

The "protection of restrictive laws," says Mr. Hawes, "is a snare and a delusion." This kind of wording is a delusion. A patent for what never existed cannot restrict, and the snare is to be found only in the miserable condition of the Patent Law. It is the class of argument which objects to cheap law, and denies people justice, lest it should make them litigious.

The good easy class of people, who belong to large companies, or hold practical business monopolies, cared little about patents till limited partnership came to the aid of the patentees, to place them on a level with their brethren in France and the United States. They then took the alarm, and Lord Overstone and Mr. Glyn are samples of the class opposition which still makes the Limited Liability Act almost a dead letter.

In truth, it is the great struggle between power in possession and power out of possession. The former is incessantly striving to build up barriers to keep the stronger intellects that may push the occupants from their stools. Business people do not object to patents, provided they possess them. Every business man likes a monopoly if he can get it. When the electric telegraph was first made practicable, a company, being as they thought a monopoly, bought the invention for a large sum; subsequent patents they bought up, and bullied the owners of others accord-

ing to law. But it was unavailing, and the chairman of the company, by his evidence, sought to overthrow the patent laws altogether, alleging them to be a mischief to all parties. And, viewed from his monopoly-desiring side of the question he was right. Without patent protection for invention, no inventor would have tried to supersede the company's plans, and they would have retained a monopoly. Neither magnetic nor any other telegraph would have appeared in opposition.

Other companies, treading in their footsteps, are trying to do the same thing. Patent-mongering is the order of the day, and the whole system of railways appears destined to be overwhelmed by it. If we take up a railway journal we find a patent permanent-way company, a patent axle-box company, a patent switch and crossing company, and, no doubt, we shall have a patent locomotive and a waggon company in due time. Inventors, if poor, find themselves "cabinéd, cribbed, confined," and driven into the open jaws of the patent mongers. Limited liability tends to defeat this, for the individual with the improved plan, put upon equal terms, will infallibly beat the company with the inferior plan. This the grand company does not like, and, with Lord Overstone and Mr. Glyn at their head, want to sap the Limited Liability Act and cut short the capital. It is the old story of rival tradesmen, the large capitalist seeking to ruin the small one.

At this particular time the world rings with complaints of the evils of competition carried to excess, because the intellect of buyers from government claimants is competent to know that four is less than five, but not that four is worse than five, so low price carries all before it, inferiority included. Now patented improvements are precisely calculated to give the remedy for this; emulous patentees will not damage their respective inventions by inferiority because they are not competed with to the mischievous extent. Patents are valuable both to the inventor and to the public, in the same way that land becomes more valuable to the individual and the public by dividing into farms. Instead of fallow common it becomes cultivated fields, but which no one will cultivate without the right to the usufruct.

There is a deeper depth yet into which the capitalists will be wise to look ere they try to prevent the expansion of genius. The holders of land, and house, and factory, and mine, and forest, and the precious metals, say in their heart, like the fool in Scripture, "We have and will keep all we have got of material wealth, and will make common stock of the brains by which it is rendered useful." But give them their will—take away patents in England—and the inventive men of genius will flock to France and the United States, leaving the men of capital to compete with each other, and with an improving external world, till they have eaten one another up! And if America and France were to do the same thing, the inventive men will seek to civilise the Russians and other savages, who do, at any rate, appreciate genius exercised for destruction. Or it may be, that the men of genius, deprived of the legitimate use of their brains and their property in them, to use them as a means of rising in the social scale, will begin to inquire very curiously as to what right the present holders have to the existing material wealth of the world; why it should not be divided, share and share alike, like the brains? A revolution of a novel kind would be the result of this. It would be socialism on a grand scale.

Patents for things are but another version of copyright in books, and they are part and parcel of the great safety-valve that keeps the world quiet by holding out hope to the energetic. Without patents, every engineer on a railway, every master of a factory, would make mind his helot; invention would be done to order, or not done at all, as the farmer breaks the eggs of the game he is not allowed to shoot. Emulation would be at a stand-still, and tyranny rampant. Unscrupulous chiefs would purloin and appropriate the brains of individuals when no record

existed to tell the tale; and the genius of a Watt subordinated to a quack, would be rewarded with 40s. or £5 as compensation for the loss of his birthright. The eternal laws of God are opposed to this wholesale robbery, and vain and fruitless are all attempts to hedge in this cuckoo of a would-be general monopoly, keeping back progress in order that the existing vested interests may continue to draw the first prizes to the exclusion of other aspirants.

JETHRO PYM.

DECIMAL COINAGE—THE PENNY SYSTEM.

SIR,—In Friday's *Journal*, Mr. Minasi shows, from a work published about 200 years ago, that but one out of twenty cases of exchange with foreign cities was effected with the pound sterling as the standard. The case is greatly altered now, as may be seen by reference to any number of the *Times*. Thus, in last Friday's "Course of Exchange," the pound sterling is the standard in eleven instances, while England gives pence for foreign coins in only nine.

I remain, Sir, yours obediently,
S. A. GOOD.

Pembroke Dock, March, 24, 1856.

MEETINGS FOR THE ENSUING WEEK.

- MON. Actuaries, 7.
London Inst., 7, Dr. Lankester, "On the Recent Progress of Vegetable Physiology."
Architects, 8, Mr. T. L. Donaldson, "On the Triumphal Arches of the Romans."
Chemical, 8.
- TUES. Royal Inst., 8.
Civil Engineers, 8, Mr. C. R. Drysdale, "On Steep Gradients of Railways, and the Locomotives Employed."
Linnean, 8.
Pathological, 8.
- WED. London Inst., 3, Prof. Rymer Jones, "On Entomology and the General Organisation and Metamorphoses of Insects."
Society of Arts, 8, Prof. Willis, "Description of Improved Apparatus for Teaching Mechanics in Schools."
Pharmaceutical, 8.
- THURS. Royal Inst., 3.
Zoological, 3.
Antiquaries, 8.
Photographic, 8.
Royal, 8½.
- FRI. Botanical, 8.
Royal Inst., 8½.
- SAT. Asiatic, 2.
London Inst., 3, Mr. E. W. Brayley, "On Geology."
Medical, 8.

PATENT LAW AMENDMENT ACT, 1852.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

[From Gazette March 21st, 1856.]

Dated 20th February, 1856.

436. David Auld and John Stephen, Glasgow—Improvements in steam boilers and furnaces, and in apparatus connected therewith, and in the consumption or prevention of smoke.

Dated 22nd February, 1856.

458. William Strang, Glasgow—Improvements in ornamental weaving.

Dated 25th February, 1856.

475. Bennett Johns Heywood, Dublin—Improved holder for leads, slate, and other marking materials, applicable also as a case for other articles.
477. Joshua Murgatroyd, Heaton Norris—Improvements in steam boilers.
479. Charles Iles, Birmingham—Improvements in pointing hair pins, and in making up hair pins for sale.
483. Joseph Marzolo, Padua—An incompressible mechanism, reproductive of movements, and applicable to weaving and other looms, and for industrial purposes.

Dated 26th February, 1856.

485. John Barrow, jun., Manchester—Improvements in the manufacture of soda, sulphurous and sulphuric acids, carbonic acid, chlorine and muriatic acid, and apparatus used therein.
487. Samuel Henn and Thomas Haddon, Gibb-street Works, Birmingham—Improvements in the mode or modes of forming or making the heads of ornamental nails, when such heads are formed of a different metal or metals from the shanks of the same.
488. George Coats, Glasgow—Improvements in partitions or "brattices" for coal mines and other underground works.
489. Fernand Rodolphe Penor, Darmstadt—Improvements in looms for weaving. (A communication.)
491. John Cornes, Swan-lane—Improvements in machines for washing and churning.
493. Francis Thompson, Sheffield—Improvement in skates.
495. George Parry, Ebbw Vale Iron Works, Monmouth—Improvement in the puddling and refining of iron.
497. George Tomlinson Bousfield, Sussex-place, Loughboro'-road, Brixton—Improvements in power looms. (A communication.)

Dated 27th February, 1856.

499. Peter Armand le Comte de Fontainemoreau, 39, Rue de l'Ecliquier, Paris—A new cicatrising preparation. (A communication.)
503. Edward Ellis Allen, 376, Strand—Improvements in the permanent way of railways.
505. Thomas Taylorson Jopling, Bishop's Wearmouth—Improved construction of water meter.

Dated 28th February, 1856.

507. William Thompson and Charles Wilson, Birmingham—Improvements in buttons, and in attaching the same to articles of dress.
509. Isaac Westhorp, London—Improvements in concentrating milk, and in obtaining concentrated extracts from tea, coffee, and chocolate. (A communication.)
511. Charles Frow, Wakefield—Improvements in furnaces for steam boilers and other purposes.
513. Elisha Thomas Archer, Cedar-cottage, Wandsworth—Improvements in envelopes for the transmission of letters or parcels.
515. Pierre Louis Grosrenaud, St. Etienne—Improvements in apparatus or furnaces for melting and puddling metals.

Dated 29th February, 1856.

517. James Logan, Liverpool—Improvements in pumps, which improvements are especially applicable to bilge pumps on board ships and steam vessels.
519. John Markett, Lieut., R.N., Hastings—Improvements in the manufacture of envelopes.
521. John Greenwood, Rawden, near Leeds—Improvements in heating water for the supply of steam boilers.
523. Charles Barlow, 89, Chancery-lane—Improvements in machinery for cutting cloth and other textile fabrics. (A communication.)

Dated March 1st, 1856.

527. Robert Frederick Miller, Hammersmith—Improved omnibus.
529. Henry Andrew Dewar, Aberdeen—Improvements in conveying or transmitting motion for effecting mechanical operations.
531. Paul Rapsey Hodge, 4, Albion-grove, Islington—Improvements in the method of lighting domestic fires.
533. Alfred Francis, Encomb-terrace, Wandsworth-road—Improvements in the manufacture of a composition applicable as a cement or plaster, and to other purposes.
535. Cyprien Marie Tessié du Motay, 24, Rue Fontaine St. George, Paris, and Jean Jacques Fontaine, 19, Rue Paradis-Poissonnière, Paris—Improvements in treating cast-iron.

Dated 3rd March, 1856.

539. Adolphus Oppenheimer, Manchester—Improvements in machinery or apparatus for stretching or distending velvets and other piled goods or fabrics, for the purpose of cutting the pile of such goods.
541. Julius Homan, Milk-street, Cheapside—Improved mode of driving sewing machines.
543. John Edward Hodges, Leicester—Improvements in machinery for the manufacture of looped and textile fabrics.
545. John Edward Hodges, Leicester—Improvements in machinery for the manufacture of looped fabrics.

Dated 4th March, 1856.

547. Louis Coddé, M.D., 39, Rue de l'Ecliquier, Paris—A system of submarine communication.
549. Thomas Lambert, New Cut, Lambeth—Improvements in apparatus for regulating the drawing off of water and other fluids.
551. Martin Samuelson, Scott-street, Hull—Improvements in screw propellers.

WEEKLY LIST OF DESIGNS FOR ARTICLES OF UTILITY REGISTERED.

No. in the Register.	Date of Registration.	Title.	Proprietors' Name.	Address.
3820	March 20.	{ Heap's Improved Pipe and Nut Wrench { An Improved Grate, for Heating, { Ventilating, and Economising Coals }	William Heap	Oldham-road, Ashton-under-Lyne.
3821	March 25.		Frederick Cornwall	Hanley-street, Birmingham.